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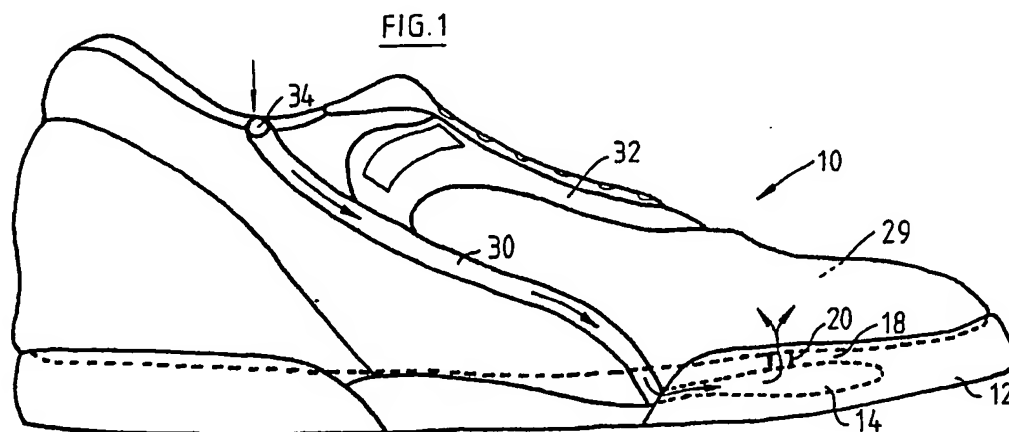
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(54) **Footwear**

(57) In order to provide forced ventilation of an article (10) of footwear, the sole (12) has a pump cavity (14), which, as the wearer walks or runs, sucks in air via an inlet duct (30), and exhausts it through ports (20) in the sole to the interior of the article of footwear. Valves are provided on the air inlet and outlet openings. Duct (30) follows a seam line of the upper.



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FIG. 1

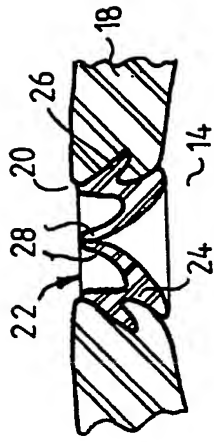
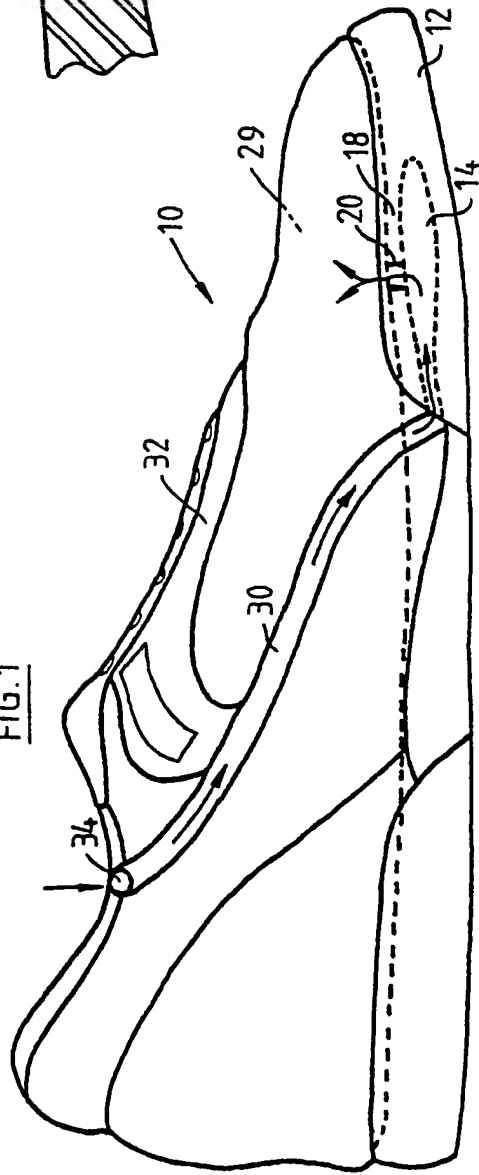


FIG. 3

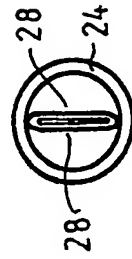


FIG. 4

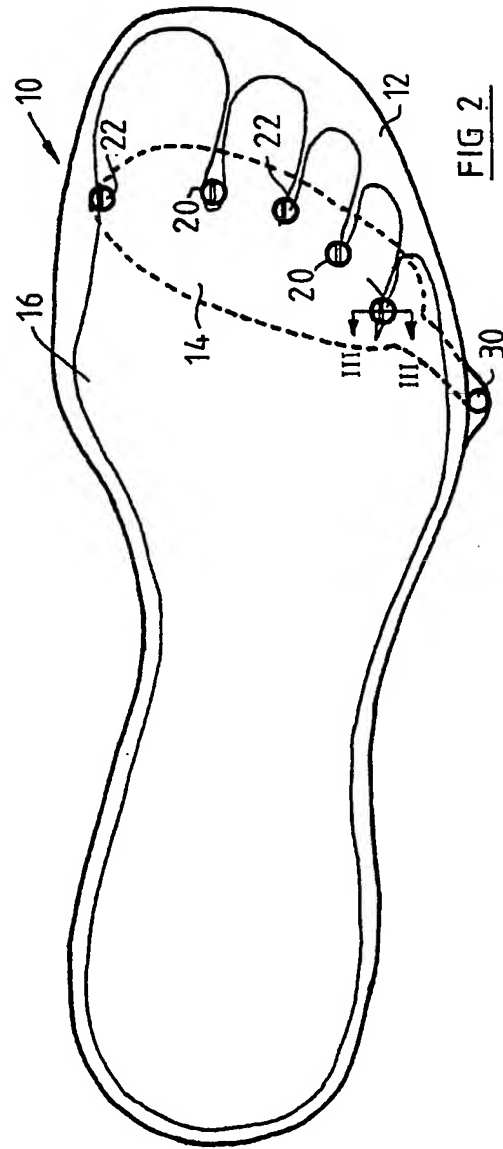


FIG. 2

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FOOTWEAR

This invention relates to articles of footwear and particularly to ventilation of articles of footwear.

It has been well known for ages to make articles of footwear such as shoes or boots, from a material which "breathes", such as leather, in order to prevent an excessive build-up of sweat in the article and to keep the wearer's foot cool and comfortable. However, leather footwear is expensive, and with the advent of plastics materials it has been possible to manufacture footwear more cheaply, but many plastics materials are not naturally permeable to air, and sweating is thus a problem.

The present invention seeks to overcome this problem, and also to provide increased ventilation in the case of leather footwear, by incorporating a pump in the article of footwear, arranged so that the pump is actuated by a walking or running action of the wearer to provide ventilation.

There follows a description by way of example of a specific embodiment of the present invention with reference to the accompanying drawings, in which:

Figure 1 is a side view of a trainer shoe;

Figure 2 is a top plan view of the sole of the shoe, also showing the outline of a wearer's foot;

Figure 3 is a partial sectioned side view, on a larger scale, of the sole and an outlet valve, taken only along the section line III-III in Figure 2, and

Figure 4 is a plan view of the outlet valve.

Referring to the drawings, a trainer shoe 10 is of conventional

construction, except in the following respects. The resilient sole 12 of the shoe has a cavity 14 formed within its thickness. The cavity is disposed generally under the ball region of the wearer's foot 16, or slightly forwardly thereof and extends over a major portion of the width of the sole. The height of cavity 14 is about one-third to one-half of the thickness of sole 12, and the capacity of the cavity is about 20 ml.

The region 18 of the sole 12 above the cavity 14 is formed with a series of five holes 20, which correspond in position to inner ends of the gaps between the wearer's toes and a position to the inside of the wearer's big toe. Each of these holes 20 is fitted with a non-return valve 22, which as shown in detail in Figures 3 and 4 is a plastic moulding having a cylindrical portion 24 with an external rib 26 which keys into a corresponding groove in region 18 of the sole and a pair of internal flaps 28 which extend inwardly and upwardly. The flaps 28 normally seal together, but when a load is applied on the sole by the wearer's foot 16 during walking or running and the cavity 14 is compressed, the air pressure in the cavity forces the flaps 28 apart and so air is expelled from the cavity into the interior 29 of the shoe 10 in the region of the wearer's toes. When the load is subsequently removed, the flaps 28 re-seal and prevent air re-entering the cavity via the valves 22.

In order to replenish the cavity 14 with air, an inlet duct 30 is provided which extends from a position adjacent the top of the upper 32 of the shoe, along a seam line of the upper of the shoe, to the sole 12 and thence through the sole to the cavity 14. The duct 30 may be provided by an integrally moulded pipe and "flash" which is stitched to the upper 32. In order to prevent air escaping through the duct 30 when the sole 12 is compressed, a further non-return valve 34 is fitted either to the inlet of the duct, or at a location in the sole immediately before the duct 30 joins the cavity 14. The inlet of the duct 30 is provided at a high level in order to reduce the amount of dirt and rain which is drawn into the duct 30.

It will be appreciated from the above that, when a load is placed on the sole by the wearer, air is expelled from the cavity into the interior of the shoe around the wearer's toes, and as the load is removed, the

resilience of the sole causes the cavity to regain its uncompressed shape and air is drawn into the cavity through the inlet duct. This expulsion and replenishment of air is repeated with each step and results in the wearer's foot being kept cool and comfortable.

Various modifications may be made to the shoe described above. For example, the cavity may be provided with outlet ports in other parts of the sole, such as the heel region, and the cavity may also be repositioned, for example in the heel region. It will be appreciated that the invention is not limited to being used with trainer shoes, but may be employed in other types of shoe and boots.

CLAIMS

1. An article of footwear incorporating a pump which is actuated by a walking/running action to ventilate the article of footwear.
2. An article as claimed in claim 1, wherein the pump has a pump chamber within the thickness of a flexible sole portion of the article and at least one outlet port arranged to exhaust air from the chamber through the sole portion to the interior of the article of footwear.
3. An article as claimed in claim 2, wherein the pump chamber is arranged to lie generally below the ball of the wearer's foot.
4. An article as claimed in claim 2 or 3, wherein a plurality of said outlet ports are provided, each arranged to exhaust air adjacent the roots of the wearer's toes.
5. An article as claimed in any of claims 2 to 4, wherein the outlet port is provided with a non-return valve.
6. An article as claimed in any preceding claim, wherein the pump has an inlet duct through which air is sucked from a level above the sole of the article of footwear.
7. An article as claimed in claim 6, wherein the inlet duct is provided with a non-return valve.
8. An article as claimed in claim 6 or 7, wherein the inlet duct follows a seam line of the upper of the article of footwear.
9. An article of footwear, substantially as described with reference to the drawings.